EXECUTIVE SUMMARY

Thank you for your continued hard work sampling **Laurel Lake** this year! Your monitoring group sampled the deep spot three times this year and has done so for many years. As you know, conducting multiple sampling events each year enables DES to more accurately detect water quality changes. Keep up the great work!

Please remember that one of your most important responsibilities as a volunteer monitor is to educate your association, community, and town officials about the quality of your lake and what can be done to protect it! DES biologists may be able to assist you in educating your association members by attending your annual lake association meeting.

We encourage your monitoring group to formally participate in the DES Weed Watchers program, a volunteer program dedicated to monitoring lakes and ponds for the presence of exotic aquatic plants. This program only involves a small amount of time during the summer months. Volunteers survey their waterbody once a month from **May** through **September**. To survey, volunteers slowly boat, or even snorkel, around the perimeter of the waterbody and any islands it may contain. Using the materials provided in the Weed Watcher kit, volunteers look for any species that are suspicious. After a trip or two around the waterbody, volunteers will have a good knowledge of its plant community and will immediately notice even the most subtle changes. If a suspicious plant is found, the volunteers immediately send a specimen to DES for identification. If the plant specimen is an exotic species, a biologist will visit the site to determine the extent of the problem and to formulate a management plan to control the nuisance infestation. Early detection is the key to controlling the spread of exotic plants.

If you would like to help protect your lake or pond from exotic plant infestations, contact Amy Smagula, Exotic Species Program Coordinator, at 271-2248 or visit the Weed Watchers website at www.des.nh.gov/organization/divisions/water/wmb/exoticspecies/weed_watcher.htm.

OBSERVATIONS & RECOMMENDATIONS

DEEP SPOT

➢ Chlorophyll-a

Chlorophyll-a, a pigment found in plants, is an indicator of algal or cyanobacteria abundance. Algae are typically microscopic plants that are naturally found in the lake ecosystem. The measurement of chlorophyll-a in the water gives biologists an estimation of the algal concentration or lake productivity. Table 14 in Appendix A lists the current year chlorophyll-a data.

Figure 1 depicts the historical and current year chlorophyll-a concentration in the water column.

The median summer chlorophyll-a concentration for New Hampshire's lakes and ponds is 4.58 mg/m^3.

The current year data (the top graph) show that the chlorophyll-a concentration ***decreased*** from **June** to **July**, and then ***increased*** from **July** to **August**.

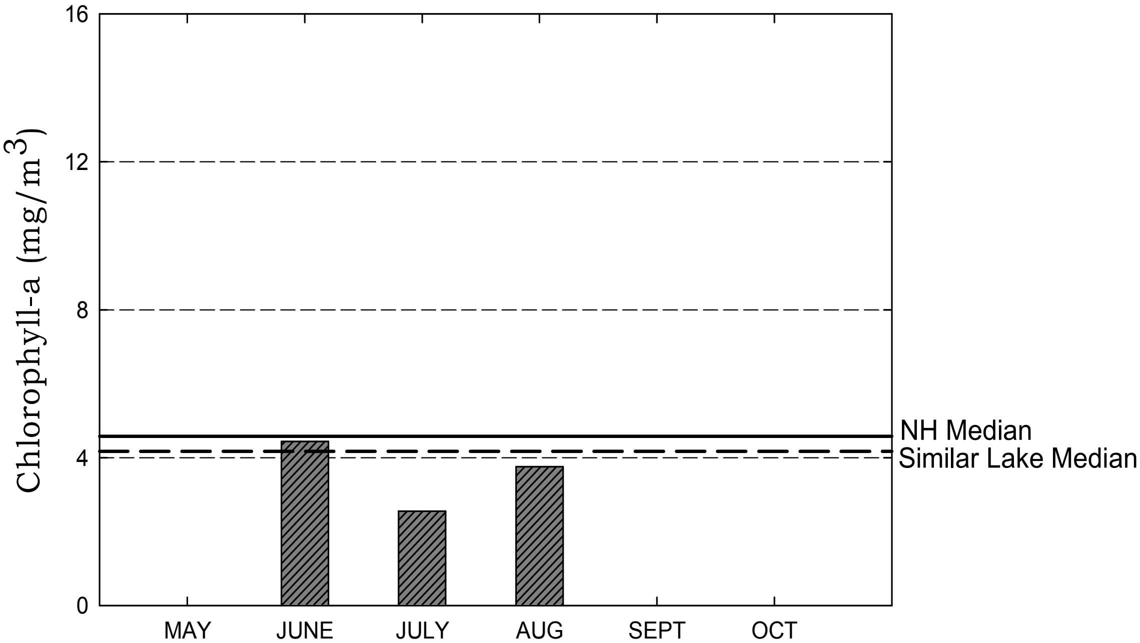
The historical data (the bottom graph) show that the **2009** chlorophyll-a mean is ***slightly less than*** the state and similar lake medians. For more information on the similar lake median, refer to Appendix D.

Overall, visual inspection of the historical data trend line (the bottom graph) shows a ***decreasing*** in-lake chlorophyll-a trend since monitoring began. Specifically the mean chlorophyll concentration has ***improved*** since **1989**.

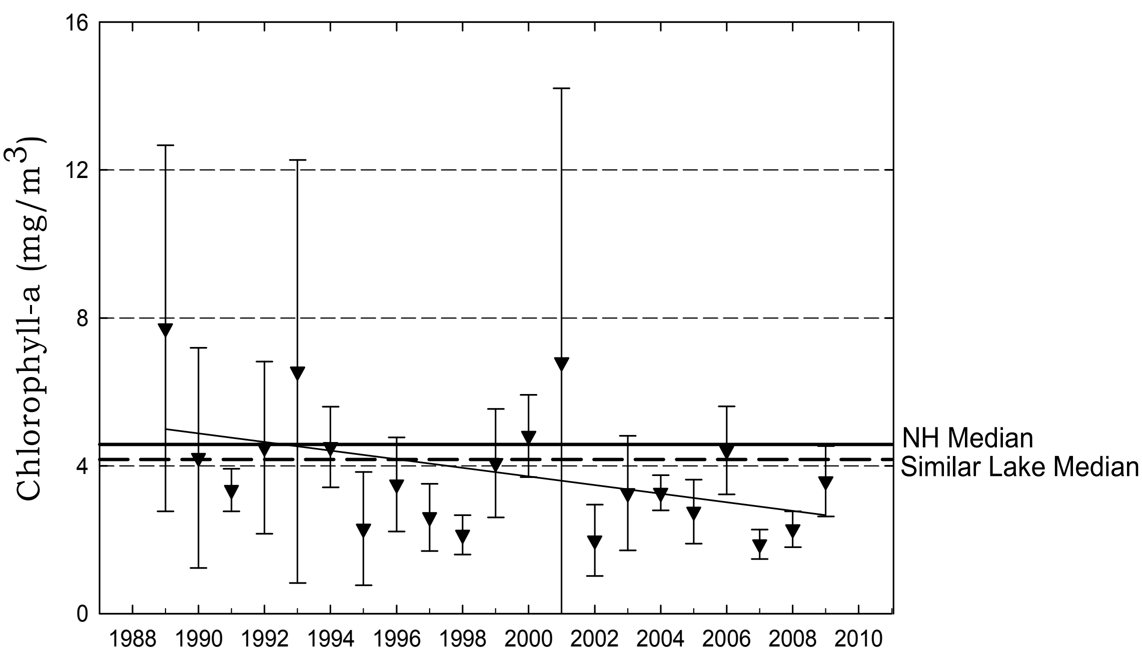
While algae are naturally present in all waterbodies, an excessive or increasing amount of any type is not welcomed. Phosphorus is the nutrient that algae typically depend upon for growth in New Hampshire lakes and ponds. Algal concentrations increase as nonpoint sources of phosphorus from the watershed increase, or as in-lake phosphorus sources increase. Increased Chlorophyll-a concentrations can also affect water clarity, causing Secchi-disk transparency to decrease (worsen) and turbidity to increase (worsen).
Therefore, it is extremely important for volunteer monitors to continually educate all watershed residents about management practices that can be implemented to minimize phosphorus loading to surface waters.

Laurel Lake, Fitzwilliam

Figure 1. Monthly and Historical Chlorophyll-a Results



2009 Chlorophyll-a Results



Historical Chlorophyll-a Results

➢ Phytoplankton and Cyanobacteria

Table 1 lists the phytoplankton (algae) and/or cyanobacteria observed in the pond in **2009**. Specifically, this table lists the three most dominant phytoplankton and/or cyanobacteria observed and their relative dominance in the sample.

Table 1. Dominant Phytoplankton/Cyanobacteria (August 2009)

Division	Genus	% Dominance
Chrysophyta	Chrysosphaerella	27.4
Bacillariophyta	Rhizosolenia	21.0
Cyanophyta	Anabaena	14.5

Phytoplankton populations undergo a natural succession during the growing season. Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding seasonal plankton succession. Diatoms and golden-brown algae populations are typical in New Hampshire's less productive lakes and ponds.

The cyanobacterium ***Anabaena*** was observed in the **August** plankton sample. ***This cyanobacteria, if present in large amounts, can be toxic to livestock, wildlife, pets, and humans.*** Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding cyanobacteria.

Also, during the August biologist visit, high concentrations of cyanobacteria were noted at several locations along the shore of the lake. Please observe the lake during summer months for any visible surface scums and notify DES promptly.

Cyanobacteria can reach nuisance levels when phosphorus loading from the watershed to surface waters is increased and favorable environmental conditions occur, such as a period of sunny, warm weather.

The presence of cyanobacteria serves as a reminder of the pond's delicate balance. Watershed residents should continue to act proactively to reduce nutrient loading to the pond by eliminating fertilizer use on lawns, keeping the pond shoreline natural, re-vegetating cleared areas within the watershed, and properly maintaining septic systems and roads.

In addition, residents should also observe the pond in September and October during the time of fall turnover (lake mixing) to document any algal blooms that may occur. Cyanobacteria have the ability to regulate their depth in the water column by producing or releasing gas from vesicles. However, occasionally lake mixing can affect their buoyancy and cause them to rise to the surface and bloom. Wind and currents tend to "pile" cyanobacteria into scums that accumulate in one section of the pond. If a fall bloom occurs, please collect a sample in any clean jar or bottle and contact the VLAP Coordinator.

➢ Secchi Disk Transparency

Volunteer monitors use the Secchi disk, a 20 cm disk with alternating black and white quadrants, to measure how far a person can see into the water. Transparency, a measure of water clarity, can be affected by the amount of algae and sediment in the water, as well as the natural color of the water. Table 14 in Appendix A lists the current year transparency data. **The median summer transparency for New Hampshire's lakes and ponds is 3.2 meters.**

Figure 2 depicts the historical and current year transparency ***with and without*** the use of a viewscope.

The current year ***non-viewscope*** in-lake transparency ***increased*** from **June** to **July**, and then ***decreased*** from **July** to **August**.

It is important to note that as the chlorophyll concentration ***decreased*** from **June** to **July**, the transparency ***increased***, and as the chlorophyll ***increased*** from **July** to **August**, the transparency ***decreased***. We typically expect this ***inverse*** relationship in lakes. As the amount of algal cells in the water increases, the depth to which one can see into the water column typically decreases, and vice-versa.

The current year ***viewscope*** in-lake transparency ***increased*** from **June** to **July** and then ***decreased*** from **July** to **August**.

The transparency measured with the viewscope was generally ***greater than*** the transparency measured without the viewscope this summer. As discussed previously, a comparison of the transparency readings taken with and without the use of a viewscope shows that the viewscope typically increases the depth to which the Secchi disk can be seen into the lake, particularly on sunny and windy days. We recommend that your group measure Secchi disk transparency with and without the viewscope on each sampling event.

It is important to note that viewscope transparency data are not compared to a New Hampshire median or similar lake median. This is because lake transparency with the use of a viewscope has not been historically measured by DES. In the future, the New Hampshire and similar lake medians for viewscope transparency will be calculated and added to the appropriate graphs.

The historical data (the bottom graph) show that the **2009** mean non-viewscope transparency is ***slightly greater than*** the state and similar lake medians. Please refer to Appendix D for more information about the similar lake median.

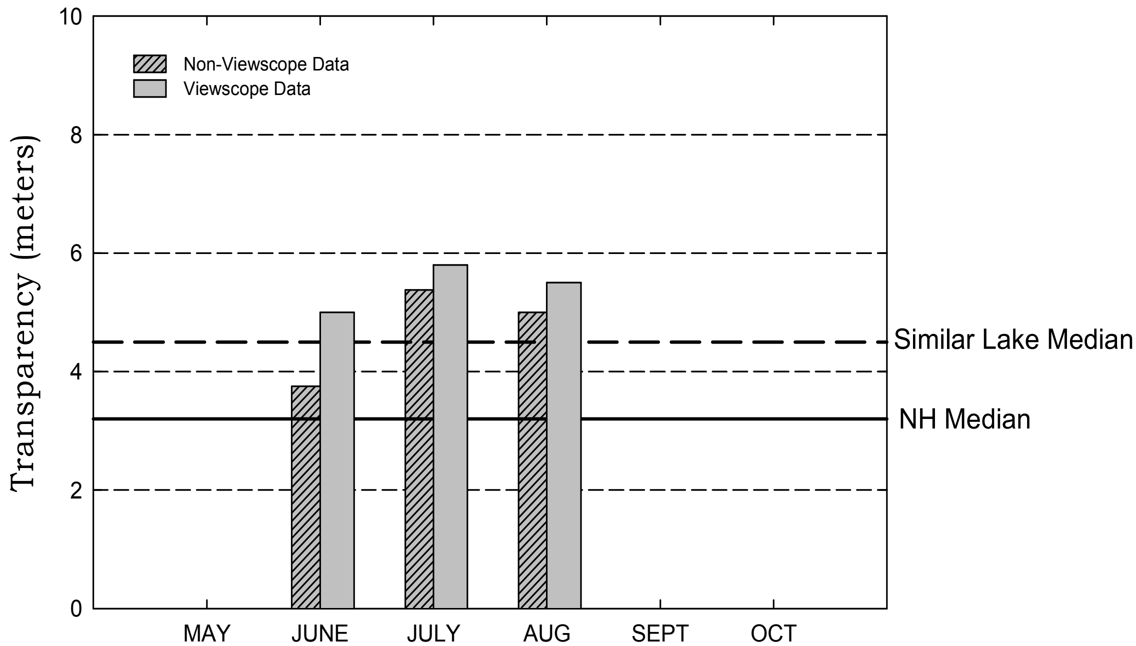
Visual inspection of the historical data trend line (the bottom graph) shows a ***decreasing*** trend, meaning that the transparency has ***worsened*** since monitoring began in **1989**.

Typically, high intensity rainfall causes sediment-laden stormwater runoff to flow into surface waters, thus increasing turbidity and decreasing clarity. Efforts should continually be made to stabilize stream banks, pond shorelines, disturbed soils within the watershed, and especially dirt roads located immediately adjacent to the edge of tributaries and the pond. Guides to best management practices that can be implemented to reduce, and possibly even eliminate, nonpoint source pollutants, are available from DES upon request.

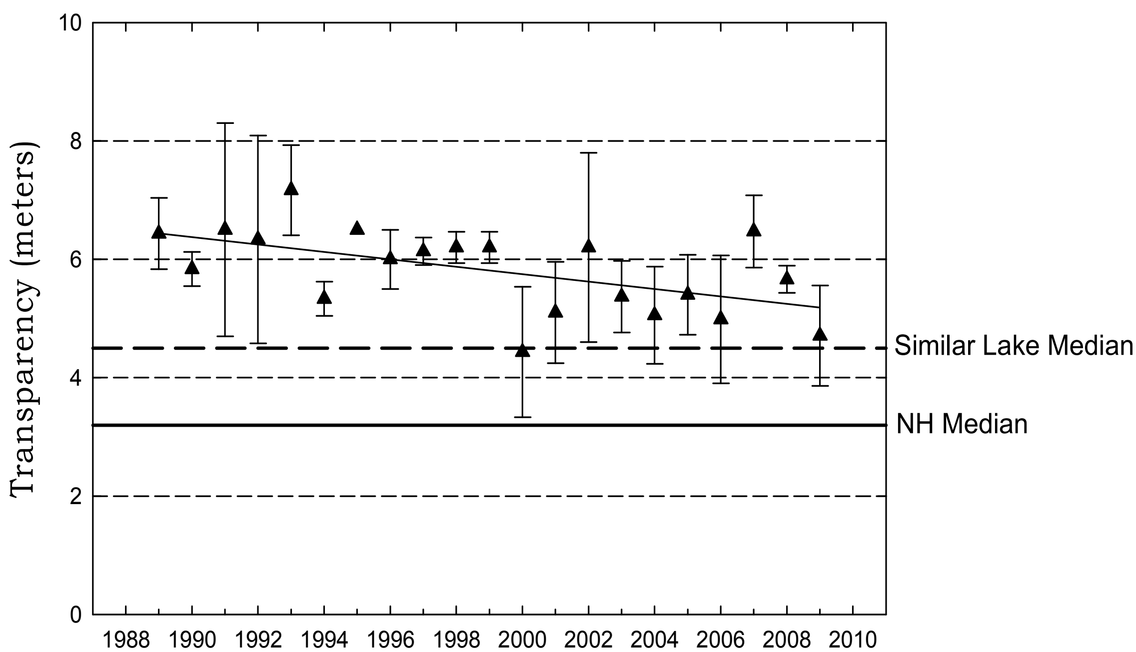
We recommend that your group continue to measure the transparency with and without the use of the viewscope on each sampling event. Ultimately, we would like all monitoring groups to use a viewscope to take Secchi disk readings as the use of the viewscope results in less variability in transparency readings between monitors and sampling events. At some point in the future, when we have sufficient data to determine a statistical relationship between transparency readings collected with and without the use of a viewscope, it may only be necessary to collect transparency readings with the use of a viewscope.

Laurel Lake, Fitzwilliam

Figure 2. Monthly and Historical Transparency Results



2009 Transparency Viewscope and Non-Viewscope Results



Historical Transparency Non-Viewscope Results

➢ Total Phosphorus

Phosphorus is typically the limiting nutrient for vascular plant and algae growth in New Hampshire's lakes and ponds. Excessive phosphorus in a pond can lead to increased plant and algal growth over time. Table 14 in Appendix A lists the current year total phosphorus data for in-lake and tributary stations. **The median summer total phosphorus concentration in the epilimnion (upper layer) of New Hampshire's lakes and ponds is 12 ug/L. The median summer phosphorus concentration in the hypolimnion (lower layer) is 14 ug/L.**

The graphs in Figure 3 depict the historical amount of epilimnetic (upper layer) and hypolimnetic (lower layer) total phosphorus concentrations; the inset graphs depict current year total phosphorus data.

The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***increased slightly*** from **June** to **August**.

The historical data show that the **2009** mean epilimnetic phosphorus concentration is ***less than*** the state median and is ***slightly less than*** the similar lake median. Refer to Appendix D for more information about the similar lake median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration ***increased gradually*** from **June** to **August**.

The historical data show that the **2009** mean hypolimnetic phosphorus concentration is ***slightly less than*** the state and similar lake medians. Please refer to Appendix D for more information about the similar lake median.

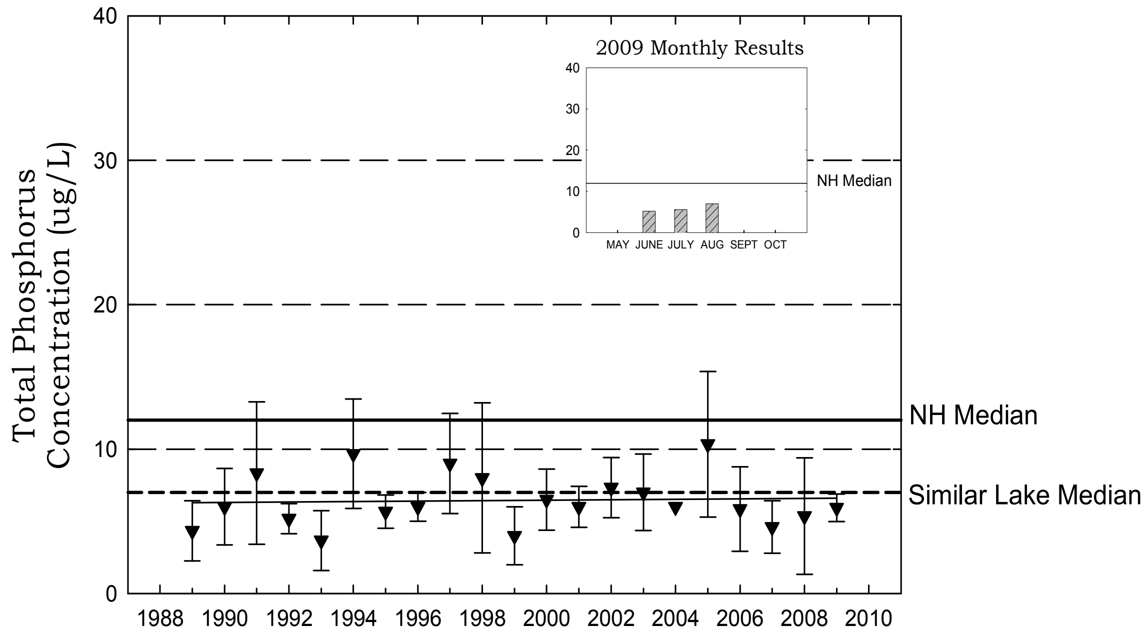
Overall, visual inspection of the epilimnetic historical data trend line shows a ***relatively stable*** phosphorus trend. Specifically, the mean annual epilimnetic phosphorus concentration has ***remained approximately the same*** since monitoring began in **1989**.

Overall, visual inspection of the hypolimnetic historical data trend line shows a ***decreasing*** phosphorus trend since monitoring began. Specifically the mean annual concentration has ***improved*** since monitoring began in **1989**.

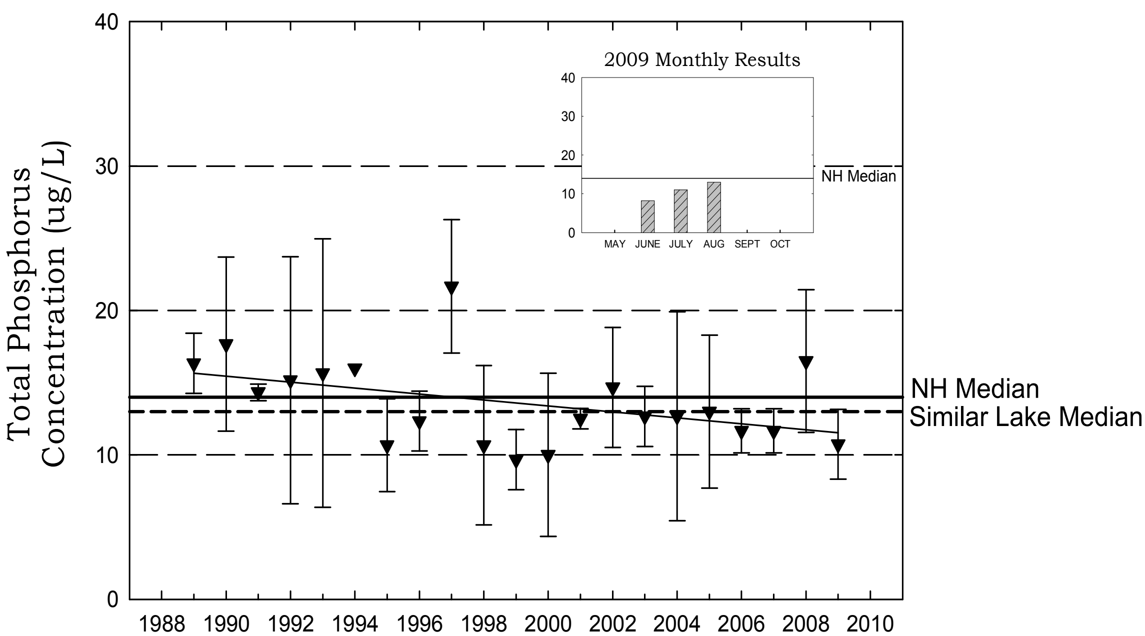
One of the most important approaches to reducing phosphorus loading to a waterbody is to continually educate watershed residents about the watershed sources of phosphorus and how excessive phosphorus loading can negatively affect the ecology and the recreational, economical, and ecological value of lakes and ponds.

Laurel Lake, Fitzwilliam

Figure 3. Monthly and Historical Total Phosphorus Data



Epilimnion (Upper Water Layer)



Hypolimnion (Lower Water Layer)

➢ pH

Table 14 in Appendix A presents the current year pH data for the in-lake stations.

pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 6.0 typically limits the growth and reproduction of fish. A pH between 6.0 and 7.0 is ideal for fish. The median pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is **6.6**, which indicates that the state surface waters are slightly acidic. For a more detailed explanation regarding pH, please refer to the "Chemical Monitoring Parameters" section of this report.

The pH at the deep spot this year ranged from **6.36 to 6.50** in the epilimnion and from **5.73 to 5.85** in the hypolimnion, which means that the water is ***slightly acidic***.

It is important to point out that the hypolimnetic (lower layer) pH was ***lower (more acidic)*** than in the epilimnion (upper layer). This increase in acidity near the bottom is likely due to the decomposition of organic matter and the release of acidic by-products into the water column.

Due to the state's abundance of granite bedrock and acid deposition received from snowmelt, rainfall, and atmospheric particulates, there is little that can be feasibly done to effectively increase pond pH. The pH at the deep spot, however, is sufficient to support aquatic life.

➢ Acid Neutralizing Capacity (ANC)

Table 14 in Appendix A presents the current year epilimnetic ANC for the deep spot.

Buffering capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input. The median ANC value for New Hampshire's lakes and ponds is **4.9 mg/L**, which indicates that many lakes and ponds in the state are at least "moderately vulnerable" to acidic inputs. For a more detailed explanation about ANC, please refer to the "Chemical Monitoring Parameters" section of this report.

The acid neutralizing capacity (ANC) of the epilimnion (upper layer) ranged from **2.2 mg/L to 2.3 mg/L**. This indicates that the lake is ***moderately vulnerable*** to acidic inputs.

➢ Conductivity

Table 14 in Appendix A presents the current conductivity data for in-lake stations.

Conductivity is the numerical expression of the ability of water to carry an electric current, which is determined by the number of negatively charged ions from metals, salts, and minerals in the water column. The median conductivity value for New Hampshire's lakes and ponds is **40.0 uMhos/cm**. For a more detailed explanation, please refer to the "Chemical Monitoring Parameters" section of this report.

The **2009** conductivity results for the epilimnion were ***lower than*** has been measured **during the past few years**.

The record rainfall during the **2009 summer season** possibly diluted the ion concentration in surface waters throughout the watershed. Specifically, the significant summer rainfalls likely increased the flushing rate for many lakes allowing potential watershed pollutants to flush through the system and not concentrate in the stratified surface waters.

➢ Dissolved Oxygen and Temperature

Table 9 in Appendix A depicts the dissolved oxygen/temperature profile(s) collected during **2009**.

The presence of sufficient amounts of dissolved oxygen in the water column is vital to fish and amphibians and also to bottom-dwelling organisms. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

The dissolved oxygen concentration was ***much lower in the hypolimnion (lower layer) than in the epilimnion (upper layer)*** at the deep spot on the **August** sampling event. As stratified lakes age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion by the process of decomposition. Specifically, the reduction of hypolimnetic oxygen is primarily a result of biological organisms using oxygen to break down organic matter, both in the water column and particularly at the bottom of the lake where the water meets the sediment. When hypolimnetic oxygen concentration is depleted to less than 1 mg/L, **as it was on the annual biologist visit this year and on many previous annual visits**, the phosphorus that is normally bound up in the sediment may be re-released into the water column, a process referred to as ***internal phosphorus loading***.

The ***low*** hypolimnetic oxygen level is a sign of the lake's ***aging*** health. This year the DES biologist collected the dissolved oxygen profile in **August**. We recommend that the annual biologist visit for the **2010** sampling year be scheduled during **July** so that we can determine if oxygen is depleted in the hypolimnion ***earlier*** in the sampling year.

- **Turbidity**

Table 14 in Appendix A presents the current year data for in-lake turbidity.

Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is strongly influenced by turbidity. Please refer to the "Other Monitoring Parameters" section of this report for a more detailed explanation.

The turbidity of the epilimnion (upper layer) sample was ***slightly elevated*** (**1.44 NTUs**) on the **June** sampling event.

The abnormally wet conditions this summer likely led to increased stormwater runoff entering the lake. Stormwater runoff can carry particulate matter and deposit it in the lake causing turbid conditions. Or, an algal bloom had occurred in the lake.

TRIBUTARY SAMPLING

➢ **Total Phosphorus**

Table 14 in Appendix A presents the current year total phosphorus data for tributary stations. Please refer to the "Chemical Monitoring Parameters" section of the report for a detailed explanation of total phosphorus.

The phosphorus concentration in the **Campground 2, Campground 3 and Campground 4** samples on the **6/9/2009** sampling event was ***elevated*** **(40, 31 and 20 ug/L)**, however, the turbidity was ***not elevated*** **(0.61, 0.80 and 0.39 NTUs)**.

Phosphorus concentrations increased from the upstream Campground 4 station to the downstream Campground 2 station. This is a heavily wooded, wetland tributary system with no evident anthropogenic pollution sources, indicating that the elevated phosphorus concentrations may be a natural occurrence. However, efforts to properly maintain the gravel road(s) should be made to reduce road washout and erosion. Also, it had rained approximately **0.5 inches** during the **24 hours** prior to the **6/9/2009** sampling event. It is likely that watershed wetland systems were releasing phosphorus-enriched water into the tributaries that drain the wetland area.

The phosphorus concentration in the **Keene Ave Trib** samples on the **6/9/2009, 7/13/2009 and 8/10/2009** sampling events was ***elevated*** **(60, 55 and 60 ug/L)**, however, the turbidity was ***not elevated*** **(0.84, 0.98 and 0.74 NTUs)**.

The phosphorus concentration in the **Keene Ave Trib Before Lake** samples on the **6/9/2009, 7/13/2009 and 8/10/2009** sampling events was ***elevated*** **(59, 62 and 63 ug/L)**, however, the turbidity was ***not elevated*** **(0.95, 1.61 and 0.79 NTUs)**.

The phosphorus concentration in the **Spaulding/Townsend** samples on the **7/13/2009 and 8/10/2009** sampling events was ***elevated*** **(75 and 34 ug/L)**, however, the turbidity was ***not elevated*** **(1.15 and 0.72 NTUs)**.

Record summer rainfall likely increased stormwater runoff and nutrient loading to the tributaries. As impervious surface cover increases in the watershed, stormwater runoff volumes increase. This transports phosphorus-laden stormwater into tributaries and eventually the lake. However, these stations have a history of elevated and fluctuating phosphorus concentrations. We recommend contacting the VLAP Coordinator in the spring to conduct a comprehensive stream survey.

Efforts should continually be made in the watershed to reduce impervious surfaces and limit phosphorus sources such as fertilizer use, septic influences, agricultural impacts, and sediment/erosion control.

The phosphorus concentration in the **Butler Fey Trib** sample on the **8/10/2009** sampling event was ***elevated*** **(61 ug/L)**, and the turbidity was also ***slightly elevated*** **(1.18 NTUs)**. This is a new sample station and we recommend continued monitoring of this station in the future.

The phosphorus concentration in the **Townsend** sample on the **6/9/2009** sampling event was ***elevated*** **(50 ug/L)**, and the turbidity was also ***slightly elevated*** **(1.84 NTUs)**.

The phosphorus concentration in the **Spaulding** sample on the **7/13/2009** sampling event was ***slightly elevated*** **(26 ug/L)**, and the turbidity was also ***elevated*** **(4.14 NTUs)**.

Elevated turbidity levels are most often a result of sediment and/or organic material present in the sample. These materials typically contain attached phosphorus and when present in elevated amounts contribute to elevated tributary phosphorus levels.

- **pH**

Table 14 in Appendix A presents the current year pH data for the tributary stations. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation of pH.

The pH of the **Butler Fey Trib, Campground 2, Campground 3, Campground 4, Keene Ave Trib, Keene Ave Trib Before Lake, Spaulding, Spaulding/Townsend, and** Townsend tributaries is acidic. This can be caused by the presence of humic, tannic and fulvic acids. Humic, tannic and fulvic acids naturally occur as a result of decomposing organic matter such as leaves. These acids may also cause the water to be tea colored. In New Hampshire the presence of granite bedrock and acid deposition also naturally lowers the pH of freshwaters.

- **Conductivity**

Table 14 in Appendix A presents the current conductivity data for the tributary stations. Please refer to the "Chemical Monitoring Parameters" section of the report for a more detailed explanation of conductivity.

Overall, the conductivity has ***remained relatively stable and low*** in the tributaries since monitoring began.

The **Keene Ave Trib** and **Keene Ave Trib Before Lake** experienced decreased conductivity levels this season. The record rainfall during the **2009 summer season** likely diluted the ion concentration in surface waters throughout the watershed. Specifically, the significant summer rainfalls likely increased the flushing rate for many lakes allowing potential watershed pollutants to flush through the system and not concentrate in the stratified surface waters.

➢ Turbidity

Table 14 in Appendix A presents the current year turbidity data for the tributary stations. Please refer to the "Other Monitoring Parameters" section of the report for a more detailed explanation of turbidity.

The **Keene Ave Trib In Lake, Keene Ave Trib Before Lake, Spaulding, and Spaulding/Townsend** experienced turbid conditions on **7/13/2009**, likely the result of stormwater runoff from significant rain events prior to sampling. Rainfall creates runoff that washes sediment and organic materials into tributaries causing turbid water conditions. Eventually, the suspended solids settle out once the flow is reduced or the tributary flow enters the lake.

The **Butler Fey Trib** experienced slightly turbid conditions on **8/10/2009** likely the result of low flow conditions. These conditions can lead bottom sediment contamination during sample collection. Please be careful to observe tributary flow conditions and only sample when sufficient flow is present.

➢ Bacteria (*E. coli*)

Table 14 in Appendix A lists the current year data for bacteria *(E.coli*) testing. *E. coli* is a normal bacterium found in the large intestine of humans and other warm-blooded animals. *E.coli* is used as an indicator organism because it is easily cultured and its presence in the water, in defined amounts, indicates that sewage **may** be present. If sewage is present in the water, potentially harmful disease-causing organisms **may** also be present. Please refer to the "Other Monitoring Parameters" section of the report for a more detailed explanation.

The *E. coli* concentration was **low** at **Campground 2, Campground 3, Spaulding, Spaulding Upstream, and Townsend Beach** sampled on the **6/9/2009** sampling event. Specifically, each result was **40 counts or less**, which is ***much less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches and 88 counts per 100 mL for surface waters that are designated public beaches.

The *E. coli* concentration was **very low** at **North Beach, South Beach** and the **Swim Club** sampled on the **6/16/2009, 7/13/2009 and 8/10/2009** sampling events. Specifically, each result was **15 counts or less**, which is ***much less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches and 88 counts per 100 mL for surface waters that are designated public beaches.

The *E. coli* concentration was **low** at **Spaulding and Spaulding/Townsend** sampled on the **6/16/2009** sampling event. Specifically, each result was **90**

counts or less, which is ***less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches.

The *E. coli* concentration was **low** at **Keene Ave Trib, Keene Ave Trib Before Lake and Keene Ave Trib In Lake** sampled on the **7/13/2009** sampling event. Specifically, each result was **40 counts or less**, which is ***much less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches and 88 counts per 100 mL for surface waters that are designated public beaches.

The *E. coli* concentration was **low** at **Butler Fey Trib, Keene Ave Trib, Keene Ave Trib Before Lake, and Spaulding/Townsend** sampled on the **8/10/2009** sampling event. Specifically, each result was **70 counts or less**, which is ***less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches and 88 counts per 100 mL for surface waters that are designated public beaches.

The **Keene Ave Trib, Keene Ave Trib Before Lake and Townsend** *E. coli* concentrations were ***elevated*** on the **6/9/2009** sampling event. However, the **170, 160 and 130** counts per 100 mL concentration ***were not greater than*** the state standard of 406 counts per 100 mL for recreational waters that are not designated public beaches.

If you are concerned about *E. coli* levels at this station, your monitoring group should conduct rain event sampling and bracket sampling in this area to determine the bacteria sources.

For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at ***http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm****, or contact the VLAP Coordinator.*

The *E. coli* concentration in the **Spaulding/Townsend** sample was ***elevated*** on the **7/13/2009** sampling event. The **780** counts per 100 mL concentration was ***greater than*** the state standard of 406 counts per 100 mL for recreational waters that are not designated public beaches. This tributary system has a history of elevated and fluctuating *E. coli* concentrations. The system was bracketed and rain event sampling conducted however there has been no definitive *E. coli* source identified. It is possible that fecal material from domestic and/or wild animals is causing the fluctuating *E. coli* concentrations.

We recommend that your monitoring group continue to conduct rain event sampling and bracket sampling next year in this area.

For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at ***http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm****, or contact the VLAP Coordinator.*

- **Chlorides**

Table 14 in Appendix A lists the current year data for chloride sampling. The chloride ion (Cl^-) is found naturally in some surface waters and groundwaters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted **acute and chronic** chloride criteria of **860 and 230 mg/L** respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

Chloride sampling was **not** conducted during **2009**.

DATA QUALITY ASSURANCE AND CONTROL

Annual Assessment Audit

During the annual visit to your pond, the biologist conducted a sampling procedures assessment audit for your monitoring group. Specifically, the biologist observed the performance of your monitoring group while sampling and filled-out an assessment audit sheet to document the volunteer monitors' ability to follow the proper field sampling procedures, as outlined in the VLAP Monitor's Field Manual. This assessment is used to identify any aspects of sample collection in which volunteer monitors failed to follow proper procedures, and also provides an opportunity for the biologist to retrain the volunteer monitors as necessary. This will ultimately ensure that the samples volunteer monitors collect are truly representative of actual lake and tributary conditions.

Overall, your monitoring group did an ***excellent*** job collecting samples on the annual biologist visit this year! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the biologist to provide additional training. Keep up the good work!

Sample Receipt Checklist

Each time your monitoring group dropped off samples at the laboratory this summer, the laboratory staff completed a sample receipt checklist to assess and document if your group followed proper sampling techniques when collecting the samples. The purpose of the sample receipt checklist is to minimize, and hopefully eliminate, improper sampling techniques.

Overall, the sample receipt checklist showed that your monitoring group did a ***very good*** job when collecting samples this year! Specifically, the members of your monitoring group followed the majority of the proper field sampling procedures when collecting and submitting samples to the laboratory. However, the laboratory did identify a few aspects of sample collection that your group could improve upon, as follows:

- **Sample bottle volume:** Please remember to fill each sample bottle up to the neck of the bottle where the bottle curves in. This will ensure that the laboratory staff will have enough sample water to conduct all of the necessary tests.

  Please be careful to not overflow the small brown bottle used for phosphorus sampling since this bottle contains acid. If you do accidentally overflow the small brown bottle, please rinse your hands and the outside of the sample bottle and make a note of this on your field sampling sheet. The laboratory staff will put additional acid in the bottle in the laboratory to preserve the sample.

USEFUL RESOURCES

Acid Deposition Impacting New Hampshire's Ecosystems, DES fact sheet ARD-32, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-32.pdf.

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, DES Booklet WD-03-42, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-03-42.pdf.

Cyanobacteria in New Hampshire Waters Potential Dangers of Blue-Green Algae Blooms, DES fact sheet WMB-10, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-10.pdf.

How to Identify Cyanobacteria, DES Pamphlets & Brochures, (603) 271-2975 or http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/cyano_id_flyer.pdf

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, DES fact sheet WD-BB-9, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-9.pdf.

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